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NATIONAL BUREAU OF STANDARDS

Letter
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FINISHES FOR CONCRETE FLOORS

Information Section
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I. INTRODUCTION

The Bureau receives numerous requests from the public for information on finishes for concrete floors. The purpose of this letter circular is to present in one publication information that will answer inquiries of a general nature. The preparation of concrete floors including the integral coloring of the floor topping with alkali-resistant pigments, at the time of laying, is outside the scope of this letter circular. Information on this subject may be obtained by writing to the Portland Cement Association, 33 West Grand Avenue, Chicago 10, Illinois, for a copy of "Concrete Floor Finishes".

II. TYPES OF FINISHES

Concrete Floor Hardener.— Where appearance and decorative effects are of no moment, a "concrete floor hardener" is a cheap and efficient material to use on clean bare floors. It causes the surface of the concrete to harden and reduces dusting of the floor. The material may consist of magnesium fluosilicate dissolved in water — two pounds of magnesium fluosilicate to one gallon of water. Magnesium fluosilicate can be purchased in the form of white crystals from wholesale drug houses and chemical supply firms. The hardener is applied liberally in two coats (allowing 24 hours of drying between coats). Generally a gallon of solution will cover about 100 square feet. After the last coat has dried, the floor should be washed with water to remove any excess of salts. This treatment is not a cure-all for poor materials or careless workmanship during construction of the floor, but it is practical and gives satisfactory results. If desired, it can be followed later on with paint.

Sodium silicate (about one gallon of commercial sodium silicate to three gallons of water) is also used to a considerable extent as a floor hardener, particularly on industrial concrete floors that are not to be followed with paint. When so used, it gives satisfactory results.

Concrete Floor Stains and Seals.- Once a surface film of paint or enamel is applied to a concrete floor, repainting will be necessary at rather frequent intervals depending on the amount of traffic. Patching the worn areas with more paint is not satisfactory from the standpoint of appearance. This has led to the development fairly recently of dyes or stains and seals for concrete floors. One material of this type consists of a thin floor varnish of low viscosity in which a small amount of colored pigment (for example, red iron oxide) is ground by the manufacturer. An oil-soluble dye (same color as the pigment) dissolved in high-flash naphtha is added to the mixture of varnish and pigment, and the entire mass is mixed to a uniform color. Some mineral or vegetable waxes are sometimes also dissolved in the vehicle. The "stain", applied with a short, stiff bristle brush, using a scrubbing motion, penetrates to some extent into the concrete. The floor is maintained with a colored wax. Worn areas are rewaxed and thus patching is no problem. The wax should be buffed with a floor polishing machine. The wax-varnish stain does not give the effect of a well-painted floor, but it offers a quick and economical method to decorate a concrete floor.

Floor Paints and Enamels.- Probably the most popular finish on concrete floors is a paint or enamel that leaves a solid, opaque film on the surface. Paints based on tung oil and natural resins, phenol-formaldehyde resins, chlorinated and crepe rubber resins, and emulsified synthetic resins are generally used for this purpose. The two general types of paints for concrete floors are the varnish and the rubber-base types. Each type of floor paint has its limitations, and the surface finish type can not be patched without the patched area showing through.

Varnish Type.- Where the concrete floor is above grade and not on the ground and where moisture is not encountered, the varnish type of floor and deck enamel gives good service. Federal Specification TT-P-146 covers a varnish type of floor paint suitable for outdoors (porch floors) or indoors.

Rubber-Base Type.- Where the concrete floor is below grade and built on the ground (as in most basements), and where dampness due to condensation is prevalent, it is suggested that the floor not be painted. Instances have been noted where a good grade of deck paint (varnish type) has given good service on an exterior concrete porch and steps but has remained sticky or tacky on a basement floor (because of dampness present). If painting is desired, rubber resin-base floor paints (Fed. Spec. TT-P-91) are suggested. These paints dry to a hard, semi-gloss finish. They should be used only indoors or when protected from the sun. They can be obtained in gray, brown, tile red, green, and black.

III. PREPARATION AND PAINTING OF THE SURFACE

General Suggestions for Preparing the Surface.- Paint should not be applied to the concrete until it has aged for one year. The floor should be dry, and the best time to paint a concrete basement floor is during the winter or early spring (assuming there is some heating apparatus in the basement), when the humidity in the basement is very low. In general, three coats of paint are desirable on an unpainted floor, and the first coat should be thin to secure good penetration.

Preparation of the Surface for and Application of Rubber-Base Paint.- The concrete floor must be clean and dry when the paint is applied. The paint is resistant to the alkali in the concrete and does not soften when the floors become damp from condensation. This type of paint does not adhere too well to very smooth surfaces. Cement floors are frequently trowelled hard and smooth. Therefore, before applying a rubber-base paint the floor should be etched with muriatic acid (one pint to one quart of acid to one gallon of water).

The acid is "sloshed" on liberally and then brushed in with an old broom or scrubbed with fiber brushes. After about 15 minutes the floor is washed with plenty of clean water. Where there are spots that still feel smooth, these should again be etched using stronger acid (about one part of acid to three parts of water). The floor should always be flushed with plenty of water after the final etching. When the floor is dry, the rubber-base paint (at least two coats) is applied. For the first coat, the paint should be thinned with mineral spirits or with the thinner recommended by the manufacturer (one quart of thinner to one gallon of paint). The spreading rate ranges from 300 square feet on the first coat to 600 square feet for the second coat per gallon of paint.

This paint should not be applied over another type of floor paint.

A thin film of wax protects any of the finishes just described. The wax can be renewed at rather frequent intervals where traffic is heavy. A liquid floor wax of the organic solvent type is generally more serviceable than a water emulsion wax. In this connection, Letter Circular LC 627, "Care of Floors", may be helpful. This letter circular may be obtained gratis from this Bureau.

IV. REPAINTING

If the paint is in good condition except for the worn areas and it has been waxed, the surface should be scrubbed with cloths saturated with turpentine or petroleum spirits and rubbed with steel wool while wet, to remove all wax before repainting. If this is not done, the paint will not dry satisfactorily. The floor should be cleaned prior to painting. If the paint is coming off the floor, all the old paint should be removed. The old paint can be removed with a solution of caustic soda (household lye) (two pounds of caustic soda to one gallon of hot water). This is mopped on the surface and allowed to remain for 30 minutes. Then the floor is washed with hot water and scraped with a wide steel scraper. The caustic solution can also be applied by letting stand overnight on the floor a thin layer of sawdust which has been soaked in the solution. The following morning the floor is washed with hot water and the paint scraped off. The surface should be rinsed thoroughly with clean water.

If a rubber-base paint has been used, the caustic soda treatment may not be effective. In this instance, it may be necessary to use the more expensive organic solvent type of paint remover described in Letter Circular LC 749, "Paint and Varnish Removers", obtainable from this Bureau.

Again it is suggested that if the paint on the floor is a rubber-base paint, this same type be used in repainting. If the old paint on the floor is a varnish type of paint and it is desired to repaint with a rubber-base paint, all the old paint should be removed, and the floor etched with muriatic acid before applying the rubber-base paint.

V. REFERENCES

Copies of the following Federal Specifications mentioned in this letter circular may be purchased for five cents each (do not send stamps) from the Superintendent of Documents, Government Printing Office:

TT-P-91 - Paint; Rubber-Base (For), Cement-Floors

TT-P-146 - Paint; Varnish-Base (For Concrete and Wood Floors)

Information on finishes for concrete walls (and similar porous masonry), but not floors, may be found in Letter Circular LC 747, Painting Exterior Walls of Porous Masonry, obtainable from this Bureau.